

Rearing the Glow-worm, *Lampyrus noctiluca* L. (Coleoptera: Lampyridae)

By ANTHONY WOOTTON*

So far as I am aware, no one has hitherto been successful in rearing the now increasingly local glow-worm (*Lampyrus noctiluca* L.), a sexually dimorphic beetle, from ovum to imago, although a number of enthusiasts have reared out imagines from well-grown larvae. This is scarcely surprising, perhaps, since the whole cycle extends over three calendar years, and the larvae need rather special care and attention.

It may be worthy of record, therefore, that I can claim to have completed the glow-worm's life cycle in captivity, over the period July 1973 to June 1975. In July 1973, I collected a number of copulating adults in the New Forest of Hampshire and obtained fertile ova from them. (This coincided with my participation in a B.B.C. "Living World" programme on glow-worms, the recording for which was done on location on the evening of July 3rd, actual broadcasts being made on July 22nd and 25th.)

The following are annotated extracts from my diary recording the salient points in the whole project. Regrettably they are incomplete in some respects, notably in that dates and numbers of ecdyses were not fully recorded. I must emphasise that no attempt was made to "force" the larvae by keeping them artificially warm during the winter hibernation.

1973

Friday, June 29th. About 11 p.m., in very hot and humid conditions, found a pair of *L. noctiluca* in cop. in ditch by gravelled ride; the female was still glowing strongly.

Sunday, July 1st. Saw many glow-worms, most of them mating pairs (females still glowing), low down in vegetation, in ditches and at bases of bracken clumps, but very widely spaced. Collected some of these which later produced many ova in captivity. The ova are spherical, about 1 mm. in diameter and pale yellow in colour.

Tuesday, July 3rd. Found one female *L. noctiluca* in ditch and one pair in cop. on rough mud track.

Wednesday, July 4th. Several hundred ova have now been produced from the collected pairs. These were laid in plastic boxes, lined with regularly dampened blotting paper. Many of the ova have the area of blotting paper immediately around them stained a dark brownish yellow: this does not appear to be luminescent, although the eggs themselves glow strongly after dark.

Thursday, July 5th. This evening several female glow-worms were observed at the bases of bracken fronds, by roadsides and in grass by rides. The females characteristically cling to the tops of the vegetation in a gentle curve, the glowing tail segments at the same level as the head. At least four male glow-worms were attracted to the light of the research hut in evening.

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Wednesday, August 15th. There was a substantial emergence of larvae from my ova today. About 5 mm. long, most are dark grey or blackish, though others are paler, but all have distinctive white blobs at the lower outer corner of each body segment. They frequently feed communally, after one has overcome a small snail, and they progress by hitching up their tail ends behind them, rather like a looper (lepidopterous) caterpillar.

Wednesday, September 12th. Several larvae have now shed their natal skins. They are generally much darker than at birth and the two white spots on each segment are consequently more pronounced. There have been casualties, due mainly to moulds and possibly overcrowding, but most seem to be thriving and are feeding on the small snails provided.

1974

Saturday, April 13th. A total of 29 larvae have successfully overwintered. During the colder months, the blotting paper lining of the larval boxes was kept damp, renewed as necessary, and a few fresh snails inserted as necessary. Little feeding was observed during the winter, even in mild periods; however the larvae have recently attacked some fresh snails. Two or three larvae are now approaching $\frac{1}{2}$ inch in length, although the majority appear to be still in their first instar (c. $\frac{1}{4}$ inch).

Saturday, April 27th. The larvae exhibit some fairly marked food preferences. They seem much to prefer the rather flat, many-spiralled snails (e.g. *Oxychilus* sp.), up to $\frac{1}{2}$ inch in diameter, commonly ignoring equally large but more spherical snails, though they attack and eat very small *Helix aspersa*, for example. One banded snail (*Cepaea* sp.) was quite ignored over a long period and eventually removed. Frequently a killed snail is only partly liquefied by the larva's digestive enzyme. In such instances it is then left to putrefy, though sometimes the larva appears capable of consuming the inert semi-solid flesh (or perhaps sucking at it?).

Wednesday, May 29th. At least eight larvae have now changed their skins for the second time and are more than $\frac{1}{2}$ inch in length. I have a feeling that growth may have been accelerated by non-examination (and continuous darkness) for a couple of days.

Saturday, June 1st. A large proportion of larvae have now completed their second ecdysis and are feeding well. This evening, with the aid of a hand lens, I watched a larva cleaning itself subsequent to feeding. The white terminal "brush", capable of extrusion from the last segment, is tubular with a multi-branched tip, and is sticky, giving something of the impression of a hog's-hair brush. The larva "washed" its legs, mouthparts, head and top of first body segment, rather like a human being using a sponge. It rested at intervals and appeared to clean its sponge from time to time by rubbing it gently on the damp blotting paper.

1975

Wednesday, June 11th. After heavy casualties, caused mostly by mould whilst over-wintering, all but two of the remaining ten larvae have now pupated. Three are males, c. $\frac{1}{2}$ inch long or less, darkish brown in colour, with elytra clearly defined. Five are females, larger and larviform, pale greyish and dirty pink in colour.

Friday, June 20th. The cycle was completed today with the emergence of a perfect adult female. She glowed very brightly in the evening, the three luminescent segments at the end of her abdomen clearly exposed and the area immediately around the insect brightly illuminated.

Sunday, June 22nd. A total of three adult females and one male have now emerged. Two male pupae and two female pupae remain. Two larvae have yet to pupate.

Monday, June 23rd. A further male and female have emerged. Just subsequent to emergence the male's elytra were a lovely cream colour, as were the wings (splayed beyond the elytra) and the thoracic shield, although the latter is dark centred.

Tuesday, June 24th. The latest count is of four females and three males, one of the latter emerging slightly deformed. One further female died in pupa form. There are still two larvae, rather more than $\frac{1}{2}$ inch long. Matings have taken place and a large number of ova has been produced. These latter in turn began to produce larvae on August 1st.

Summary

The life cycle of *Lampyrus noctiluca* L. appears normally to extend over two complete years: ova laid in July 1973 produced larvae which hibernated the following winter, recommenced feeding in spring 1974, overwintered again, and matured in late June 1975. However, not all larvae appear to mature in the third summer; two were still in larval form in July/August 1975 and showed no signs of feeding or growth. Evidently moisture is necessary for all stages of successful rearing, since the insects are very prone to dessication. The high mortality rate was presumably due to various causes: moulds (unavoidable), possibly over-crowding, and also when very small to drowning/smothering in snail slime. Killed snails need to be removed rather quickly after the larvae have obviously abandoned them since putrefaction quickly sets in, and scrupulous cleanliness in general is necessary at all times. The larvae feed only sporadically and often seem to go for days without feeding. Some sort of shelter, for skin changing, etc., is preferable and the larvae thrive and grow better in subdued light. Very large snails, e.g. adult *Helix aspersa*, *Cepaea* sp., etc., are invariably ignored, even by last instar larvae. Favourite prey seems to be *Oxychilus* sp. and similarly shaped and sized snails. Ova produced in 1973 hatched after about six weeks; those incestually produced in 1975 in a slightly shorter period.

Some notes on differences between adult *Lampyris noctiluca* L. and larvae

Since adult *L. noctiluca* are often described as larviform in appearance, suggesting that the two are difficult to distinguish, a few points of difference are perhaps worth mentioning. Adult females are uniformly greyish-brown, with a thin, pale, slightly raised median line, unlike the larvae which are usually black with a white or brownish-yellow spot at the basal corner of each segment. The rounded thoracic shield of the female is similar to that of the male and very different in appearance from the flat, undifferentiated structure of the larva, whose body is more tubular. The leg structure is simpler in the larva. The antennae are relatively long (c. 2.5 mm.) in the adult male and female, short (c. 1 mm.) and peg-like in the larva. The mouthparts are typically extended beyond the thoracic shield in the larva, covered in the adult. There is a tinge of pink about the first few body segments and around the head (ventral surface) of the adult. Progress is strongly looping in the larva, more dragging in the adult female. The glowing area of the larva is confined to a pair of small dots on the last segment, whereas the adult female's (and male's) last three segments are uniformly and strongly luminescent on the ventral surface (whitish in appearance when not glowing).

THE SLOE PUG (*CHLOROCLYSTIS CHLOERATA* MABILLE) IN 1975. — After unsuccessfully attempting for two years at beating for the larva of this new British moth in the New Forest and Berkshire, I again tried the New Forest on 16th March. On this occasion after beating much sloe blossom, I obtained a small greenish-grey geometrid larva which later became lighter in colour as well as showing a very faint pinkish-brown dorsal line. This larva, and two others from Effingham, Surrey, that were more easily recognisable proved to be *chloerata*, as well as a very young grey wriggly creature from which the moth finally materialised on 19th April. I also beat four full-fed *chloerata* larvae from topmost branches of sloe at Maidenhead, Berkshire. Following a tip from Mr. Skinner I kept all beaten blossoms in a large tin from which in due course a further moth emerged.

On the fine warm night of 2nd July while collecting by the Kennet at Thatcham, I boxed a Pug from the flowers of Common Valerian (*Valeriana officinalis*), and anticipating *Eupithecia valerianata* Hb. was soon disappointed to see that it was far too large. However, since it appeared suspiciously like a worn specimen of one of my bred *chloerata*, I showed it to Mr. D. S. Fletcher who kindly confirmed it as that species. I would be interested to know if the imago of *chloerata* has been taken on any other occasion apart from at m.v. light? — MICHAEL BRITTON, 27 Patricia Close, Slough, SL1 5HT, Berks.